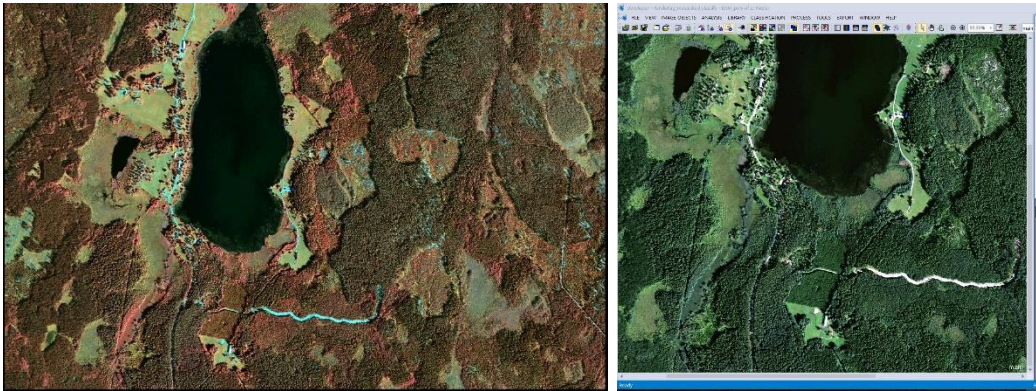


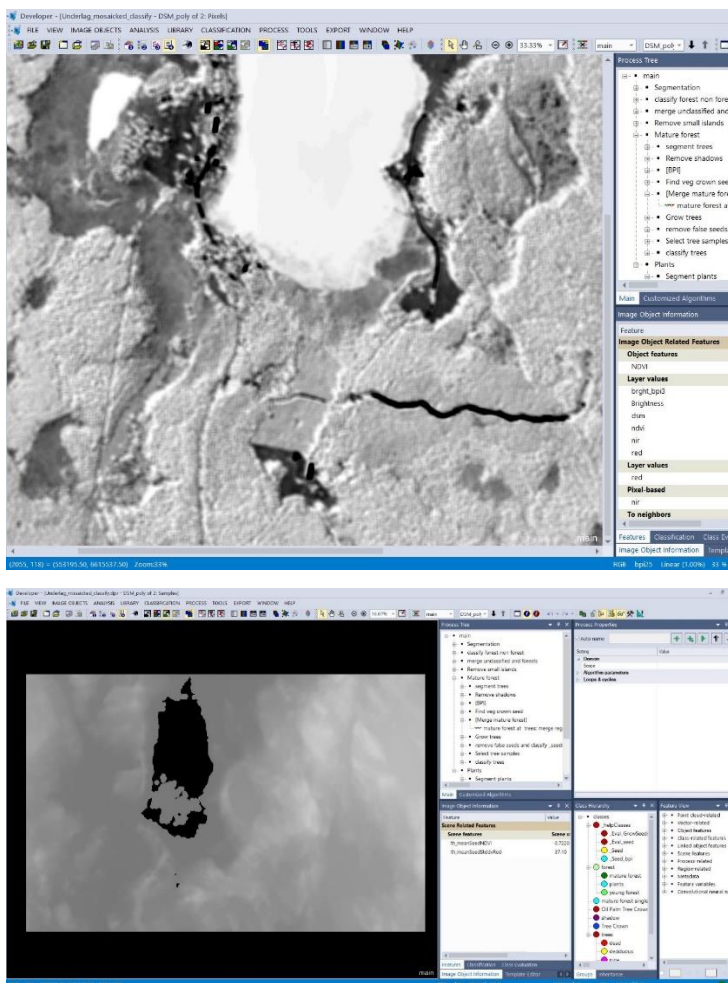
Forest mapping with eCognition Developer

TerraNor has created a ruleset in eCognition which divides the forest into forest stands and then into single trees. Course participants go through each step of the process that can be run fully automatically. Here we describe the process:



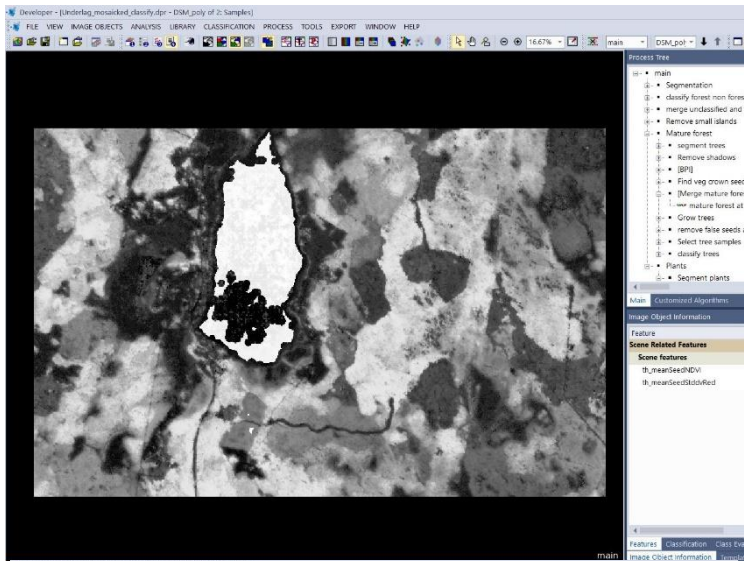
We analyze this aerial image (ADS 80) from Sweden. The image has RGB + NIR.

Below we list the data used in the analysis.

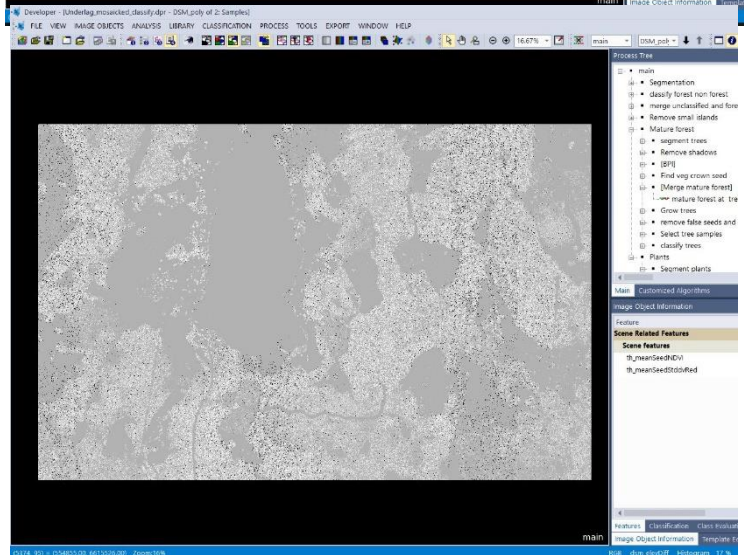


This terrain analysis shows different terrain formations. Dark lots are streams, ditches and recesses in the terrain. Elevations and dots become bright. Flat areas become neutral. Together with the presentation of deciduous trees, you can create maps showing moisture areas in the terrain.

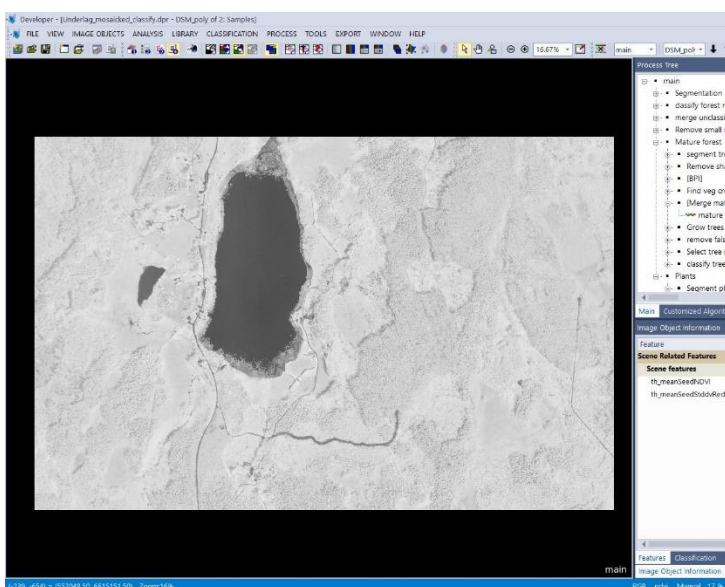
We have two elevation models from lidar data: terrain and surface. The picture shows the terrain model.



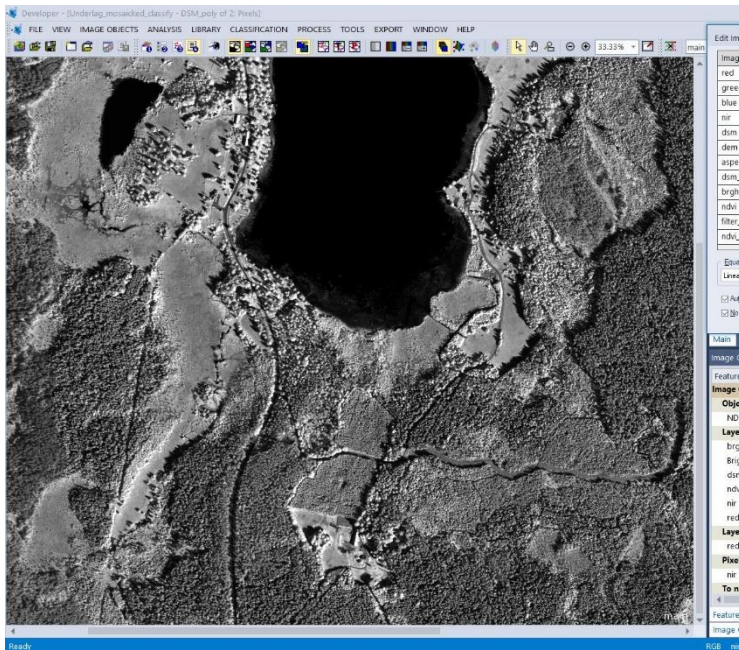
This terrain model shows the surface, ie tree top height. The model is called DSM (Digital Surface Model)



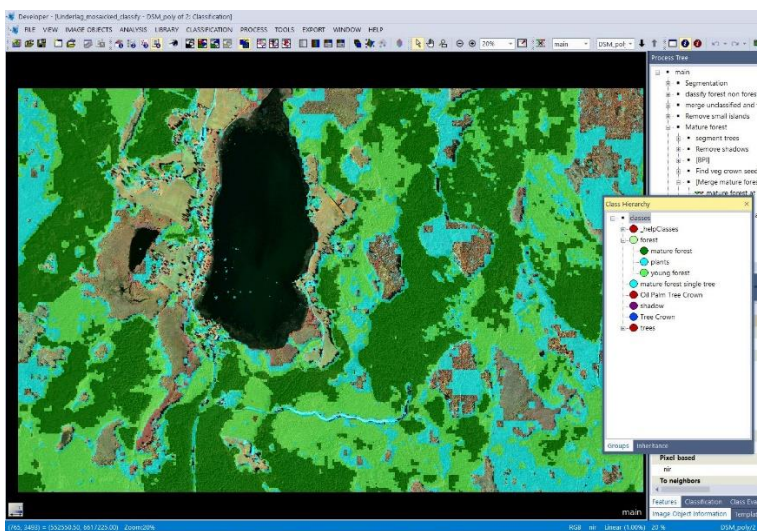
This model shows NDSM = DSM-DEM. It is the same as tree-height and house-height.



This model shows $NDVI = (NIR-Red) / (NIR + Red)$. This is one of the most important models used in forest mapping worldwide.



The near-infrared channel is most important in all vegetation mapping and in the distinction between vegetation / non vegetation.

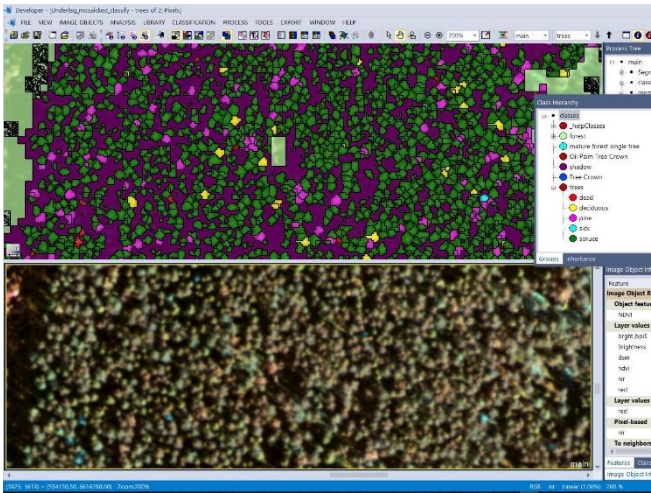


Segmentation:

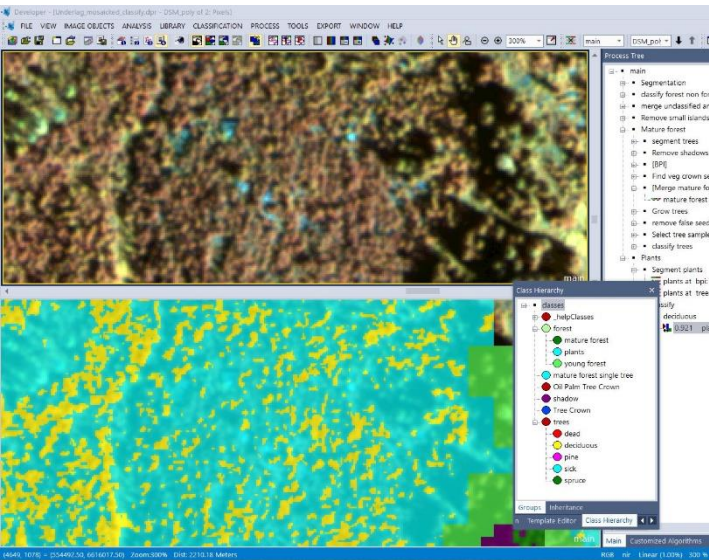
eCognition has a unique method for segmenting raster data into polygons. It is called object based analysis (OBIA). By segmentation we get polygons with similar properties. The polygons can be classified based on the properties.

There are various methods of dividing the forest into populations. Here we have chosen to start with altitude.

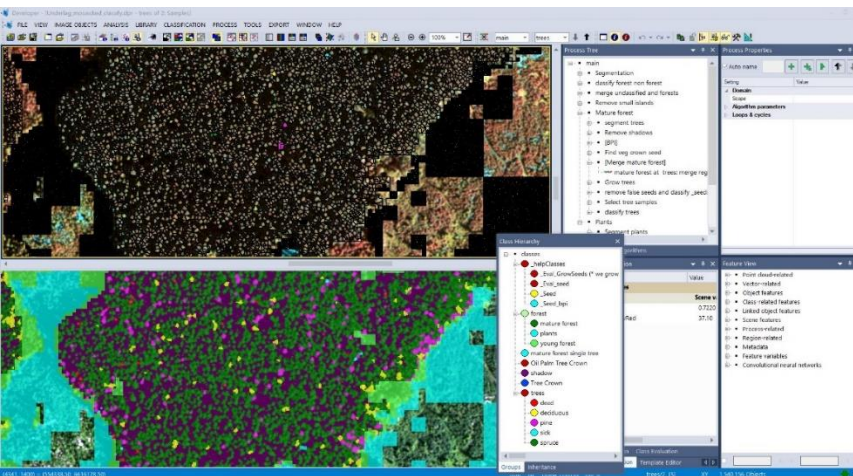
The picture shows the forest divided into three altitude classes: Old forest, young forest and plant field. The user can choose which classes, names of the classes and how many classes to divide the heights into. Such a division will vary with how far south / north the forest is, yield classes etc.



In this picture we have divided the old forest into individual trees. First we remove all that is not forest in the picture. We call it shadow (example in the example). eCognition automatically finds the tree and calculates the size of the tree. Even where many trees are close together, eCognition manages to separate most trees from each other. In the course we describe the method. With modern cameras in flight and satellite we manage to divide into 5-6 mustaches and 5-6 hardwoods. Sick and dead trees are the simplest. In the bottom half of the image they appear blue.



In the field of plants, it is often the proportion of leaves that is important to get mapped. Leaves and grasses dominate until the bar plants become large enough. eCognition can distinguish between leaves and grass.



The final classification
 We have:
 Each single tree
 Specie
 Crown size
 Height
 DbH